FIG. 1

CONSTRUCTION OF IEEE 1394 BUS TO WHICH
CONVENTIONAL BUS ANALYZER IS CONNECTED
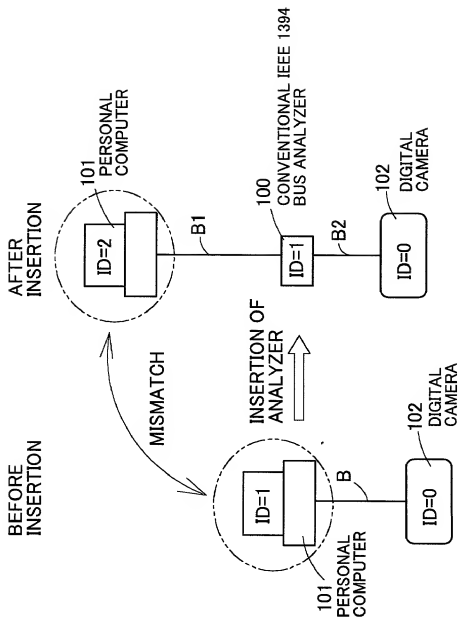

BEFORE
INSERTION

AFTER
INSERTION

MISMATCH

INSERTION OF
ANALYZER

101 PERSONAL
COMPUTER

CONVENTIONAL IEEE 1394
100 CONVENTIONAL
BUS ANALYZER

ID=2

ID=1

ID=0

B1

B2

102 DIGITAL
CAMERA

101 PERSONAL
COMPUTER

ID=1

B

ID=0

102 DIGITAL
CAMERA

FIG. 2

CONSTRUCTION IN WHICH CONVENTIONAL BUS ANALYZER IS
CONNECTED TO IEEE 1394 BUS TO WHICH A NUMBER OF
DEVICES ARE CONNECTED

FIG. 3

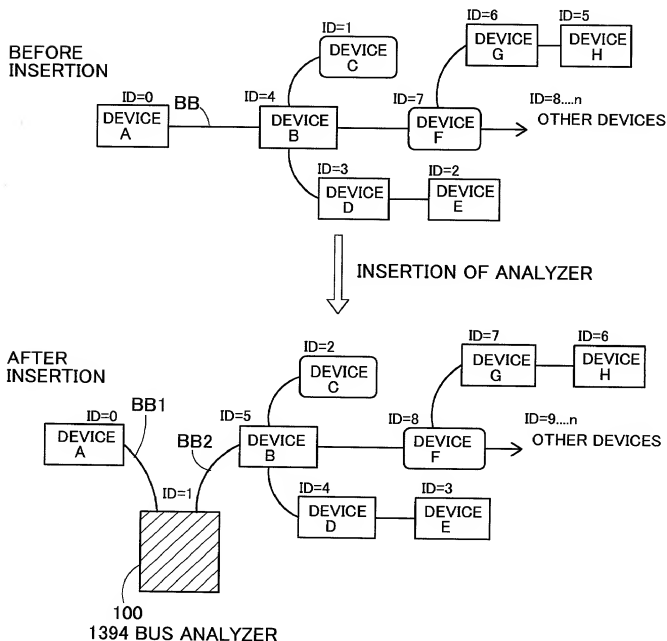CONSTRUCTION IN WHICH BUS ANALYZER OF FIRST EMBODIMENT
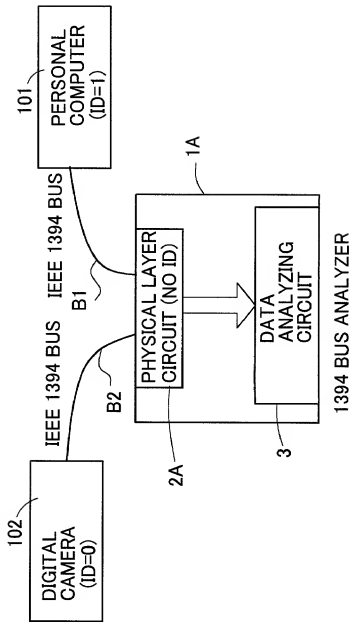IS CONNECTED TO IEEE 1394 BUS

PERSONAL
COMPUTER
(ID=1)

101

IEEE 1394 BUS

IEEE 1394 BUS

B1

IEEE 1394 BUS

B2

PHYSICAL LAYER
CIRCUIT (NO ID)

2A

DATA
ANALYZING
CIRCUIT
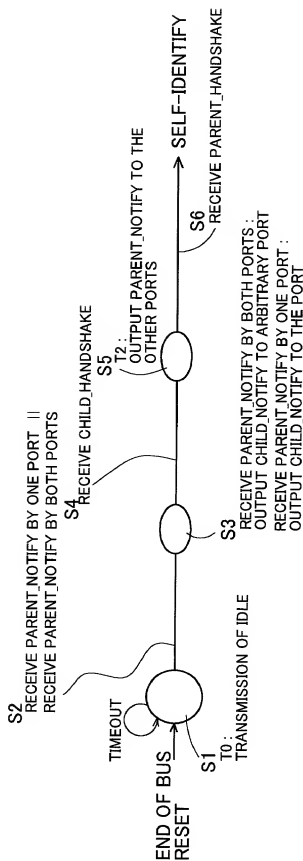
3

1A

1394 BUS ANALYZER

DIGITAL
CAMERA
(ID=0)

102

FIG. 4

4

STATE TRANSITION DIAGRAM SHOWING TREE–IDENTIFYING OPERATIION
IN FIRST EMBODIMENT

END OF BUS RESET

TIMEOUT

S1
T0:
TRANSMISSION OF IDLE

S2
RECEIVE PARENT_NOTIFY BY ONE PORT ||
RECEIVE PARENT_NOTIFY BY BOTH PORTS

S4
RECEIVE CHILD_HANDSHAKE

S5
T2:
OUTPUT PARENT_NOTIFY TO THE
OTHER PORTS

S3
RECEIVE PARENT_NOTIFY BY BOTH PORTS :
OUTPUT CHILD_NOTIFY TO ARBITRARY PORT
RECEIVE PARENT_NOTIFY BY ONE PORT :
OUTPUT CHILD_NOTIFY TO THE PORT

S6
RECEIVE PARENT_HANDSHAKE

SELF–IDENTIFY

FIG. 5

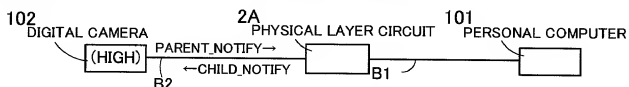STATE TRANSITION DIAGRAM SHOWING SELF-IDENTIFYING
OPERATION IN FIRST EMBODIMENT

· PARENT : PORT HAVING HIGH ARBITRATION
· CHILD : PORT HAVING LOW ARBITRATION

S7 TRANSMISSION OF IDLE

END OF TREE IDENTIFICATION

S8 RECEIVE SELF_ID_GRANT BY PARENT

S9 OUTPUT SELF_ID_GRANT TO CHILD

S10 RECEIVE SELF_ID BY CHILD

RECEIVE SELF_ID BY PARENT

END OF SELF_ID

S11 OUTPUT IDLE && RECEIVE AND TRANSFER SELF_ID

S12 RECEIVE IDENT_DONE BY CHILD

S13 · OUTPUT IDENT_DONE TO PARENT
· TRANSFER SPEED SIGNAL RECEIVED BY CHILD TO PARENT
· TRANSFER SPEED SIGNAL RECEIVED BY PARENT TO CHILD PORT

S14 RECEIVE SELF_ID BY PARENT

NORMAL ARBITRATION

FIG. 6

TREE-IDENTIFYING OPERATION IN FIRST EMBODIMENT
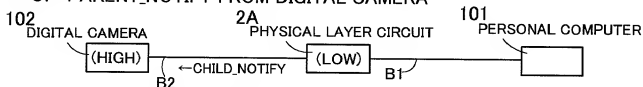(RECEIVE PARENT_NOTIFY BY ONE OF PORTS)

(P1) RECEIVE PARENT_NOTIFY FROM DIGITAL CAMERA

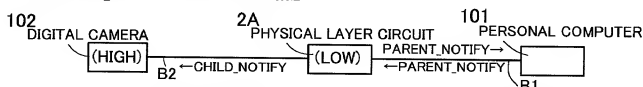102 DIGITAL CAMERA 2A PHYSICAL LAYER CIRCUIT 101 PERSONAL COMPUTER
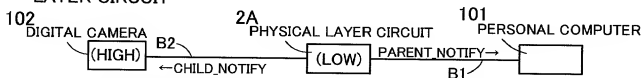
PARENT_NOTIFY→
B2 B1

(P2) OUTPUT CHILD_NOTIFY TO DIGITAL CAMERA

102 DIGITAL CAMERA 2A PHYSICAL LAYER CIRCUIT 101 PERSONAL COMPUTER
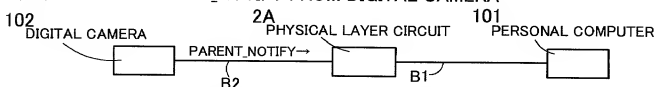
(HIGH) PARENT_NOTIFY→
←CHILD_NOTIFY
B2 B1

(P3) RECEIVE CHILD_HANDSHAKE BY STOPPING OUTPUT
OF PARENT_NOTIFY FROM DIGITAL CAMERA

102 DIGITAL CAMERA 2A PHYSICAL LAYER CIRCUIT 101 PERSONAL COMPUTER

(HIGH) (LOW)
←CHILD_NOTIFY
B2 B1
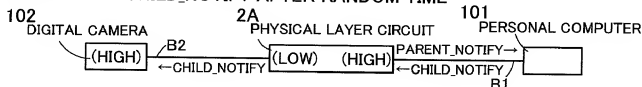
(P4) OUTPUT PARENT_NOTIFY TO THE OTHER PORT RECEIVE
ROOT_CONTENTION WHEN PERSONAL COMPUTER ALSO OUTPUTS
PARENT_NOTIFY AT THIS TIME

102 DIGITAL CAMERA 2A PHYSICAL LAYER CIRCUIT 101 PERSONAL COMPUTER

(HIGH) (LOW) PARENT_NOTIFY→
B2 ←CHILD_NOTIFY ←PARENT_NOTIFY
B1

(P5) STOP OUTPUTTING PARENT_NOTIFY FROM PERSONAL COMPUTER
BUT CONTINUOUSLY OUTPUT PARENT_NOTIFY FROM PHYSICAL
LAYER CIRCUIT

102 DIGITAL CAMERA 2A PHYSICAL LAYER CIRCUIT 101 PERSONAL COMPUTER

(HIGH) B2 (LOW) PARENT_NOTIFY→
←CHILD_NOTIFY B1

(P6) RECEIVE PARENT_HANDSHAKE WHEN PERSONAL COMPUTER
OUTPUTS CHILD_NOTIFY AFTER RANDOM TIME

102 DIGITAL CAMERA 2A PHYSICAL LAYER CIRCUIT 101 PERSONAL COMPUTER

(HIGH) B2 (LOW) (HIGH) PARENT_NOTIFY→
←CHILD_NOTIFY ←CHILD_NOTIFY
B1

(P12) STOP OUTPUTTING SIGNALS FROM BOTH PORTS, THEREBY
FINISHING TREE-IDENTIFYING OPERATION

102 DIGITAL CAMERA 2A PHYSICAL LAYER CIRCUIT 101 PERSONAL COMPUTER
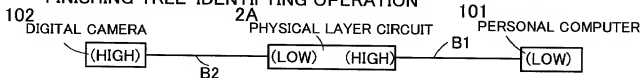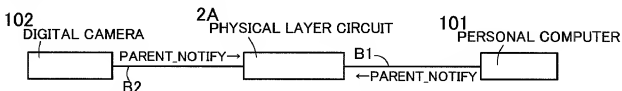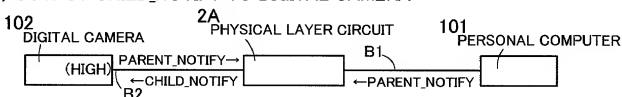
(HIGH) (LOW) (HIGH) B1 (LOW)
B2

FIG. 7

TREE-IDENTIFYING OPERATION IN FIRST EMBODIMENT
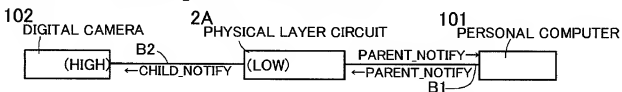(RECEIVE PARENT_NOTIFY BY BOTH PORTS)

(P7) RECEIVE PARENT_NOTIFY FROM BOTH DEVICES

(P8) OUTPUT CHILD_NOTIFY TO DIGITAL CAMERA


(P9) STOP OUTPUTTING PARENT_NOTIFY FROM DIGITAL CAMERA TO
     THEREBY RECEIVE CHILD_HANDSHAKE, AND OUTPUT PARENT_NOTIFY
     TO PERSONAL COMPUTER.
     RECEIVE ROOT_CONTENTION WHEN PERSONAL COMPUTER ALSO
     OUTPUTS PARENT_NOTIFY AT THIS TIME.

(P10) STOP OUTPUTTING PARENT_NOTIFY FROM PERSONAL COMPUTER
      BUT CONTINUOUSLY OUTPUT PARENT_NOTIFY FROM PHYSICAL
      LAYER CIRCUIT
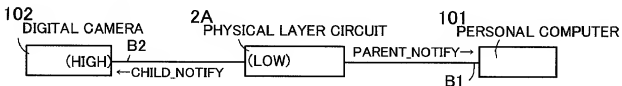
(P11) OUTPUT CHILD_NOTIFY FROM PERSONAL COMPUTER AFTER
      RANDOM TIME, THEREBY RECEIVING PARENT_HANDSHAKE
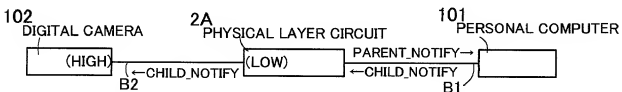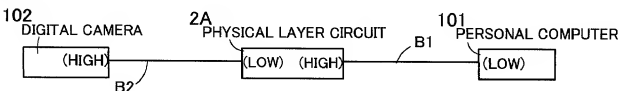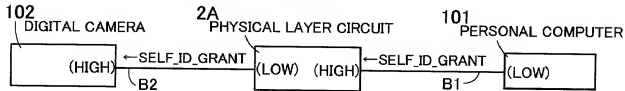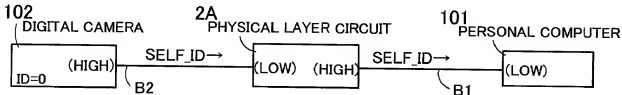

(P12) FINISH TREE-IDENTIFYING OPERATION

FIG. 8

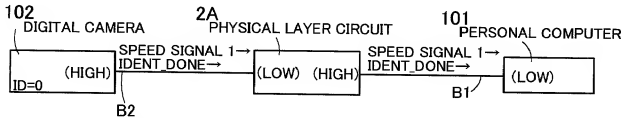SELF–IDENTIFYING OPERATION IN FIRST EMBODIMENT

(P13) RECEIVE SELF_ID_GRANT FROM PERSONAL COMPUTER AND
      TRANSFER IT TO DIGITAL CAMERA
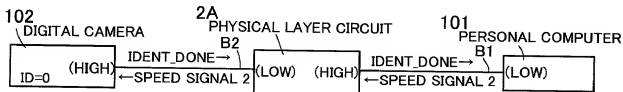
102 DIGITAL CAMERA   2A PHYSICAL LAYER CIRCUIT   101 PERSONAL COMPUTER

(HIGH) ←SELF_ID_GRANT (LOW)   (HIGH) ←SELF_ID_GRANT (LOW)
       B2

(P14) RECEIVE SELF_ID PACKET FROM DIGITAL CAMERA AND
      TRANSFER IT TO PERSONAL COMPUTER

102 DIGITAL CAMERA   2A PHYSICAL LAYER CIRCUIT   101 PERSONAL COMPUTER

ID=0 (HIGH)   SELF_ID→   (LOW)   (HIGH)   SELF_ID→   (LOW)
              B2   B1

(P15) RECEIVE IDENT_DONE PACKET AND SPEED SIGNAL FROM
      DIGITAL CAMERA AND TRANSFER THEM TO PERSONAL COMPUTER

102 DIGITAL CAMERA   2A PHYSICAL LAYER CIRCUIT   101 PERSONAL COMPUTER

ID=0 (HIGH) SPEED SIGNAL 1→   (LOW) (HIGH) SPEED SIGNAL 1→ (LOW)
             IDENT_DONE→   IDENT_DONE→
             B2   B1

(P16) RECEIVE SPEED SIGNAL FROM PERSONAL COMPUTER AND
      TRANSFER IT TO DIGITAL CAMERA

102 DIGITAL CAMERA   2A PHYSICAL LAYER CIRCUIT   101 PERSONAL COMPUTER
                      B2   B1

ID=0 (HIGH) IDENT_DONE→   (LOW) (HIGH) IDENT_DONE→   (LOW)
             ←SPEED SIGNAL 2   ←SPEED SIGNAL 2

(P17) RECEIVE SELF_ID PACKET FROM PERSONAL COMPUTER AND
      FINISH SELF_IDENTIFYING OPERATION

102 DIGITAL CAMERA   2A PHYSICAL LAYER CIRCUIT   101 PERSONAL COMPUTER
                                                  B1

ID=0 (HIGH)   ←SELF_ID   (LOW)   (HIGH)   ←SELF_ID   (LOW)   ID=1
                           NO ID
            B2
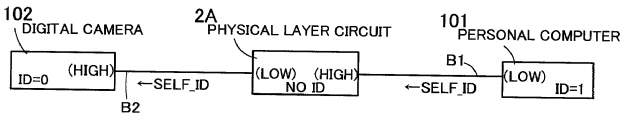
FIG. 9

FIRST MODIFICATION OF BUS ANALYZER IN FIRST EMBODIMENT

1A1 : 1394 BUS ANALYZER

PHYSICAL LAYER CIRCUIT

DATA STORING CIRCUIT

CONTROL SIGNAL

DATA

DATA

DATA

DATA ANALYZING CIRCUIT

CONTROL SIGNAL

2A1

31

4
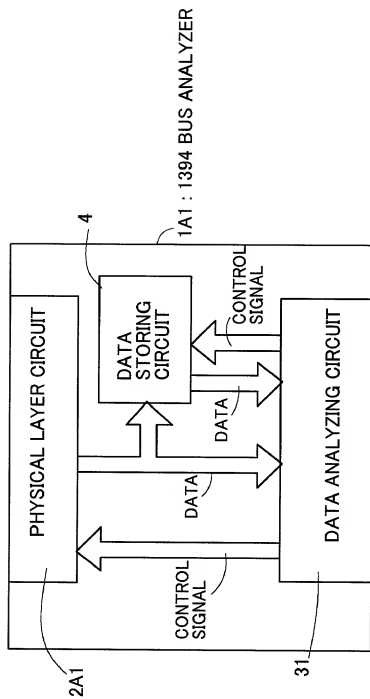
FIG. 10

SECOND MODIFICATION OF BUS ANALYZER IN FIRST EMBODIMENT

PHYSICAL LAYER CIRCUIT

DATA CONDITION DETECTING CIRCUIT

5

CONTROL SIGNAL

TRIGGER SIGNAL

DATA STORING CIRCUIT

4

CONTROL SIGNAL

DATA

DATA

CONTROL SIGNAL

DATA ANALYZING CIRCUIT

CONTROL SIGNAL

2A2

32

1A2 : 1394 BUS ANALYZER
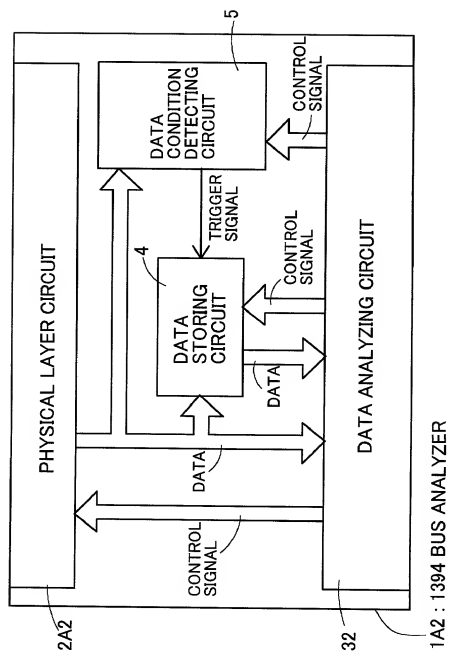
FIG. 11

THIRD MODIFICATION OF BUS ANALYZER IN FIRST EMBODIMENT

1A3 : 1394 BUS ANALYZER

PHYSICAL LAYER CIRCUIT

DATA

DATA TRANSFER CONTROL CIRCUIT

CONTROL SIGNAL

DATA

DATA ANALYZING CIRCUIT

CONTROL SIGNAL

2A3

6

33
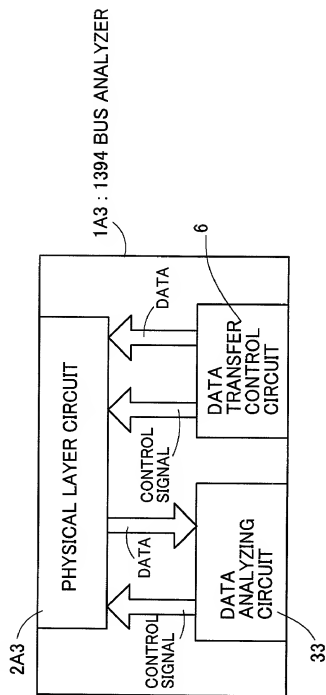
FIG. 12

FOURTH MODIFICATION OF BUS ANALYZER IN FIRST EMBODIMENT

1A4 : 1394 BUS ANALYZER

PHYSICAL LAYER CIRCUIT

2A4

DATA STORING CIRCUIT 4

DATA TRANSFER CONTROL CIRCUIT 6

DATA ANALYZING CIRCUIT 34

CONTROL SIGNAL

DATA

CONTROL SIGNAL

DATA

DATA

DATA

CONTROL SIGNAL
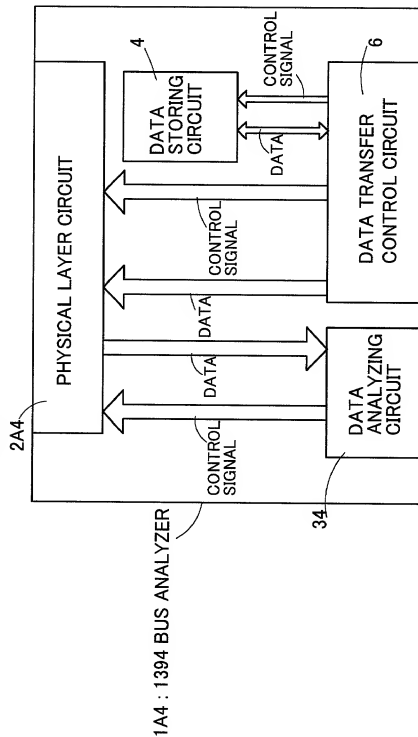
FIG. 13

FIFTH MODIFICATION OF BUS ANALYZER IN FIRST EMBODIMENT

PHYSICAL LAYER CIRCUIT

DATA STORING CIRCUIT 4

DATA TRANSMISSION CONDITION DETECTING CIRCUIT 7

DATA ANALYZING CIRCUIT 35

DATA TRANSFER CONTROL CIRCUIT 6

CONTROL SIGNAL

DATA

DATA

CONTROL SIGNAL

TRIGGER SIGNAL

CONTROL SIGNAL

CONTROL SIGNAL

DATA

2A5

1A5 : 1394 BUS ANALYZER

FIG. 14

SIXTH MODIFICATION OF BUS ANALYZER IN FIRST EMBODIMENT

1A6 : 1394 BUS ANALYZER

FIG. 15

FIRST CONSTRUCTION EXANPLE OF IEEE 1394 BUS TO WHICH
BUS ANALYZER OF SECOND EMBODIMENT IS CONNECTED

PERSONAL COMPUTER
(ID=n+1)
or
DIGITAL CAMERA
(ID=0)

103

B3 : IEEE 1394 BUS

PHYSICAL LAYER
CIRCUIT
(ID=0,1,2···,n)

2B1

3

DATA
ANALYZING
CIRCUIT

1B : 1394 BUS ANALYZER

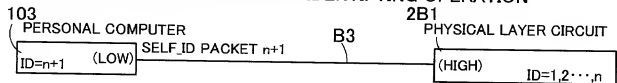FIG. 16 STATE TRANSITION DIAGRAM SHOWING SELF-IDENTIFYING OPERATION IN FIRST CONSTRUCTION EXAMPLE OF SECOND EMBODIMENT

FIG. 17

SELF–IDENTIFYING OPERATION IN FIRST CONSTRUCTION EXAMPLE OF SECOND EMBODIMENT (IN THE CASE WHERE DEVICE CONNECTED ON THE OTHER SIDE HAS HIGH ARBITRATION)

(P21) RECEIVE SELF_ID_GRANT FROM PERSONAL COMPUTER

103   2B1
PERSONAL COMPUTER   B3   PHYSICAL LAYER CIRCUIT

(LOW)   SELF_ID_GRANT→   (HIGH)
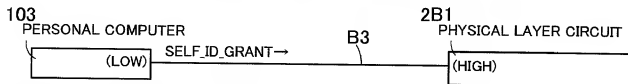
(P22) OUTPUT SELF_ID PACKET OF ID = 0 TO PERSONAL COMPUTER

103   2B1
PERSONAL COMPUTER   B3   PHYSICAL LAYER CIRCUIT

(LOW)   ←SELF_ID PACKET 0   (HIGH)   ID=0

(P23) RECEIVE SELF_ID_GRANT FROM PERSONAL COMPUTER

103   2B1
PERSONAL COMPUTER   B3   PHYSICAL LAYER CIRCUIT

(LOW)   SELF_ID_GRANT→   (HIGH)   ID=0
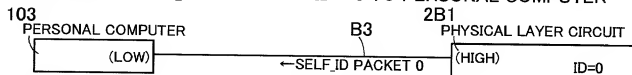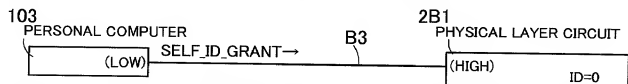
(P24) OUTPUT SELF_ID PACKET OF ID = 1 TO PERSONAL COMPUTER

103   2B1
PERSONAL COMPUTER   B3   PHYSICAL LAYER CIRCUIT

(LOW)   ←SELF_ID PACKET 1   (HIGH)   ID=0.1

⋮
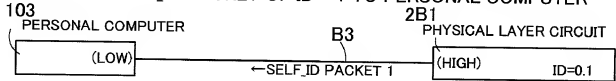
(P25) OUTPUT SELF_ID PACKET OF ID = n TO PERSONAL COMPUTER

103   2B1
PERSONAL COMPUTER   B3   PHYSICAL LAYER CIRCUIT

(LOW)   ←SELF_ID PACKET n   (HIGH)   ID=0,1···,n
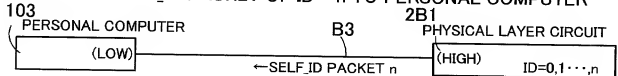
(P26) OUTPUT IDENT_DONE AND SPEED SIGNAL OF MAXIMUM TRANSFER SPEED OF PHYSICAL LAYER CIRCUIT TO PERSONAL COMPUTER AND RECEIVE SPEED SIGNAL 1 FROM PERSONAL COMPUTER
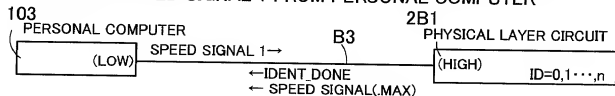
103   2B1
PERSONAL COMPUTER   B3   PHYSICAL LAYER CIRCUIT

(LOW)   SPEED SIGNAL 1→   (HIGH)   ID=0,1···,n
←IDENT_DONE
← SPEED SIGNAL(.MAX)

(P27) RECEIVE SELF_ID PACKET OF ID = (N+1) FROM PERSONAL COMPUTER AND FINISH SELF–IDENTIFYING OPERATION

103   2B1
PERSONAL COMPUTER   B3   PHYSICAL LAYER CIRCUIT

ID=n+1   (LOW)   SELF_ID PACKET n+1   (HIGH)   ID=1,2···,n
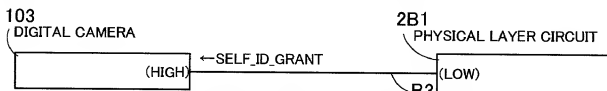
FIG. 18

SELF-IDENTIFYING OPERATION IN FIRST CONSTRUCTION EXAMPLE
OF SECOND EMBODIMENT (IN THE CASE WHERE ARBITRATION OF
DEVICE CONNECTED ON THE OTHER SIDE IS LOW)

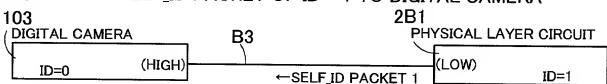(P28) OUTPUT SELF_ID_GRANT TO DIGITAL CAMERA

103
DIGITAL CAMERA

2B1
PHYSICAL LAYER CIRCUIT

(HIGH) ←SELF_ID_GRANT (LOW)
B3

(P29) RECEIVE SELF_ID PACKET OF ID = 0 FROM DIGITAL CAMERA

103
DIGITAL CAMERA

2B1
PHYSICAL LAYER CIRCUIT

(HIGH) SELF_ID_PACKET 0→ (LOW)
B3
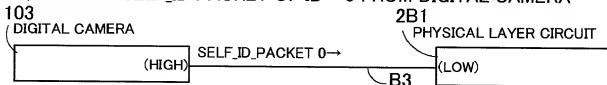
(P30) RECEIVE IDENT_DONE AND SPEED SIGNAL FROM DIGITAL CAMERA
AND OUTPUT MAXIMUM SPEED SIGNAL TO DIGITAL CAMERA

103
DIGITAL CAMERA

2B1
PHYSICAL LAYER CIRCUIT

SPEED SIGNAL 1→
(HIGH) IDENT_DONE→
ID=0 ←SPEED SIGNAL(.MAX) (LOW)
B3
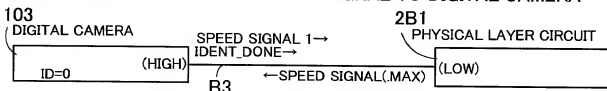
(P31) OUTPUT SELF_ID PACKET OF ID = 1 TO DIGITAL CAMERA

103
DIGITAL CAMERA

2B1
PHYSICAL LAYER CIRCUIT

B3
ID=0 (HIGH)
←SELF_ID PACKET 1 (LOW) ID=1

(P32) OUTPUT SELF_ID PACKET OF ID = 2 TO DIGITAL CAMERA

103
DIGITAL CAMERA

2B1
PHYSICAL LAYER CIRCUIT

B3
ID=0 (HIGH)
←SELF_ID PACKET 2 (LOW) ID=1,2
⋮
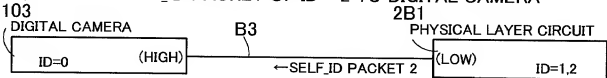
(P33) OUTPUT SELF_ID PACKET OF ID = n TO DIGITAL CAMERA

103
DIGITAL CAMERA

2B1
PHYSICAL LAYER CIRCUIT

B3
(HIGH)
ID=0
←SELF_IDPACKET n (LOW) ID=1,2···,n
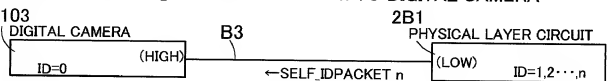
(P34) STOP OUTPUTTING SELF_ID PACKET AND FINISH
SELF-IDENTIFYING OPERATION

103
DIGITAL CAMERA

2B1
PHYSICAL LAYER CIRCUIT

B3
ID=0 (HIGH)
(LOW) ID=1,2···,n
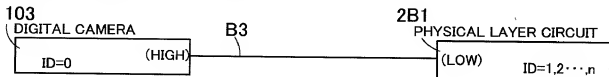
FIG. 19

SECOND CONSTRUCTION EXAMPLE OF IEEE 1394 BUS TO WHICH BUS
ANALYZER OF SECOND EMBODIMENT IS CONNECTED

IB : 1394 BUS ANALYZER

PERSONAL COOOMPUTER
(ID = n+1)
OR
DVD DRIVE (ID = 2)

104

B4

HARD DISK
(ID = 1)

105

B5

1B

PHYSICAL LAYER
CIRCUIT
(ID=2,3···,n)

2B2

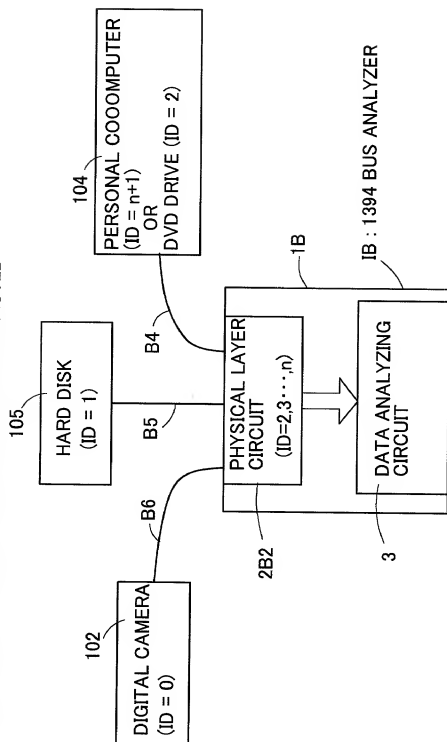DATA ANALYZING
CIRCUIT

3

B6

DIGITAL CAMERA
(ID = 0)

102

FIG. 20

STATE TRANSITION DIAGRAM SHOWING SELF-IDENTIFYING OPERATION IN SECOND
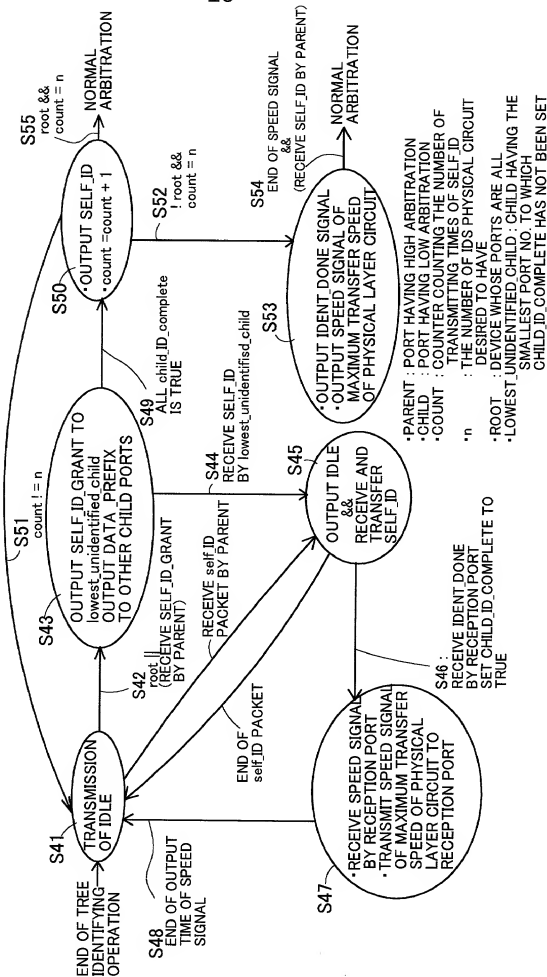CONSTRUCTION EXAMPLE OF SECOND EMBODIMENT

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- PARENT : PORT HAVING HIGH ARBITRATION
- CHILD : PORT HAVING LOW ARBITRATION
- COUNT : COUNTER COUNTING THE NUMBER OF
  TRANSMITTING TIMES OF SELF_ID
- n : THE NUMBER OF IDs PHYSICAL CIRCUIT
  DESIRED TO HAVE
- ROOT : DEVICE WHOSE PORTS ARE ALL
  UNIDENTIFIED CHILD : CHILD HAVING THE
- LOWEST_UNIDENTIFIED SMALLEST PORT NO. TO WHICH
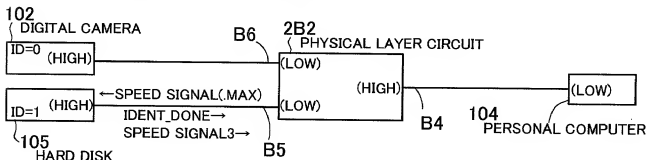 CHILD_ID_COMPLETE HAS NOT BEEN SET

FIG. 21

SELF-IDENTIFYING OPERATION (1) IN SECOND CONSTRUCTION
EXAMPLE OF SECOND EMBODIMENT (IN THE CASE WHERE DEVICE
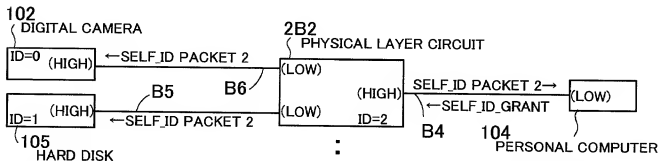CONNECTED ON THE OTHER SIDE HAS DEVICE HAVING HIGH ARBITRATION)

(P41) RECEIVE SELF_ID_GRANT FROM PERSONAL COMPUTER, OUTPUT
SELF_ID_GRANT TO DIGITAL CAMERA AND OUTPUT
DATA_PREFIX TO HARD DISK
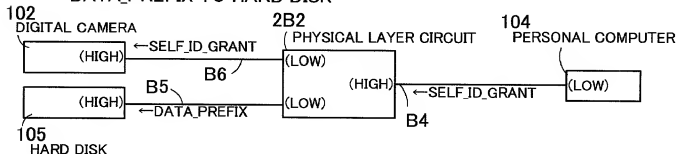
(P42) RECEIVE SELF_ID PACKET OF ID = 0 FROM DIGITAL CAMERA
AND OUTPUT IT TO PERSONAL COMPUTER AND HARD DISK
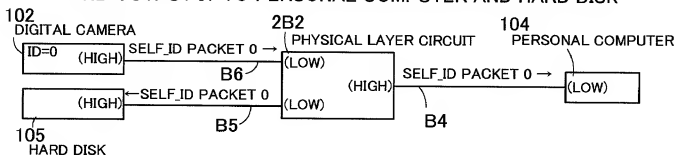
(P43) RECEIVE IDENT_DONE AND SPEED SIGNAL FROM DIGITAL CAMERA
AND OUTPUT SPEED SIGNAL OF MAXIMUM TRANSFER SPEED
OF PHYSICAL LAYER CIRCUIT TO DIGITAL CAMERA
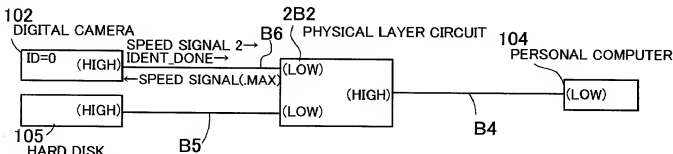
(P44) RECEIVE SELF_ID_GRANT FROM PERSONAL COMPUTER, OUTPUT
SELF_ID_GRANT TO HARD DISK AND OUTPUT DATA_PREFIX
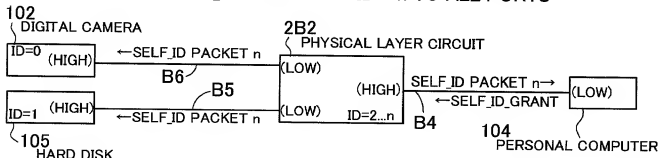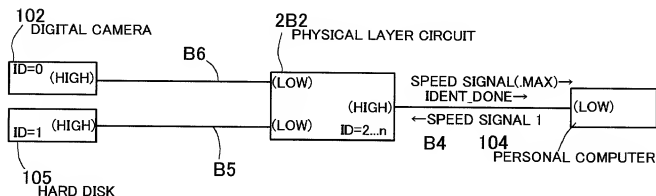TO DIGITAL CAMERA
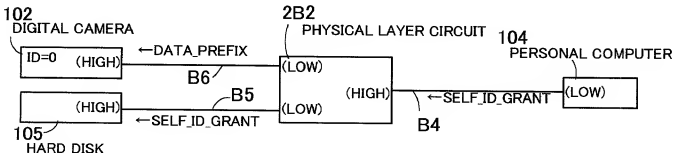
FIG. 22

SELF–IDENTIFYING OPERATION (2) IN SECOND CONSTRUCTION EXAMPLE
OF SECOND EMBODIMENT (IN THE CASE WHERE DEVICE CONNECTED ON
THE OTHER SIDE HAS DEVICE HAVING HIGH ARBITRATION)

(P45) RECEIVE SELF_ID PACKET OF ID = 1 FROM HARD DISK AND
TRANSFER IT TO PERSONAL COMPUTER AND DIGITAL CAMERA
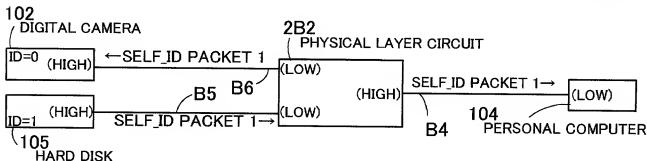
(P46) RECEIVE IDENT_DONE AND SPEED SIGNAL FROM HARD DISK
AND OUTPUT SPEED SIGNAL OF MAXIMUM TRANSFER SPEED
OF PHYSICAL LAYER CIRCUIT TO HARD DISK

(P47) RECEIVE SELF_ID_GRANT FROM PERSONAL COMPUTER
AND TRANSMIT SELF_ID PACKET OF ID = 2 TO ALL PORTS

(P48) RECEIVE SELF_ID_GRANT FROM PERSONAL COMPUTER AND
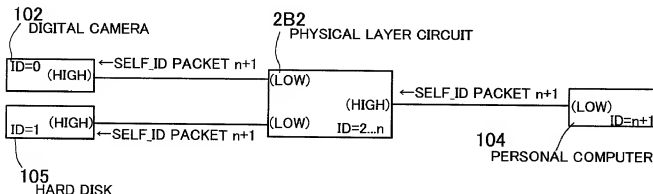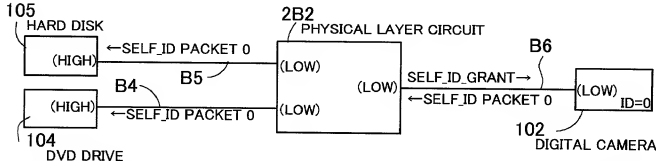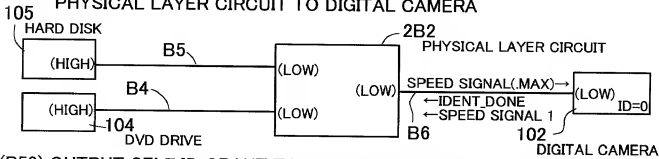TRANSMIT SELF_ID PACKET OF ID = n TO ALL PORTS

FIG. 23

SELF–IDENTIFYING OPERATION (3) IN SECOND CONSTRUCTION EXAMPLE
OF SECOND EMBODIMENT (IN THE CASE WHERE DEVICE CONNECTED ON
THE OTHER SIDE HAS DEVICE HAVING HIGH ARBITRATION)

(P49) OUTPUT IDENT_DONE AND SPEED SIGNAL OF MAXIMUM TRANSFER
SPEED OF PHYSICAL LAYER CIRCUIT TO PERSONAL COMPUTER
AFTER TRANSMITTING PACKET AND RECEIVE SPEED SIGNAL
FROM PERSONAL COMPUTER

(P50) RECEIVE SELF_ID PACKET OF ID = (n+1) FROM PERSONAL
COMPUTER, FINISH SELF–IDENTIFYING OPERATION AND
TRANSFER PACKET TO DIGITAL CAMERA AND HARD DISK

FIG. 24

SELF-IDENTIFYING OPERATION (1) IN SECOND CONSTRUCTION
EXAMPLE OF SECOND EMBODIMENT (IN THE CASE WHERE DEVICE
CONNECTED ON THE OTHER SIDE DOES NOT HAVE DEVICE HAVING
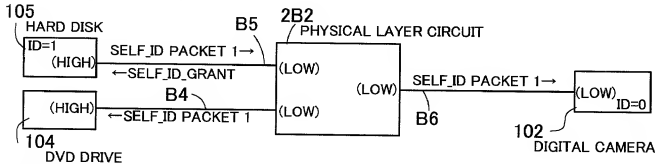HIGH ARBITRATION)

(P51) OUTPUT SELF_ID_GRANT TO DIGITAL CAMERA, RECEIVE SELF_ID
PACKET FROM DIGITAL CAMERA, AND TRANSFER IT TO HARD DISK
AND DVD DRIVE

(P52) RECEIVE IDENT_DONE AND SPEED SIGNAL FROM DIGITAL CAMERA
AND OUTPUT SPEED SIGNAL OF MAXIMUM TRANSFER SPEED OF
PHYSICAL LAYER CIRCUIT TO DIGITAL CAMERA

(P53) OUTPUT SELF_ID_GRANT TO HARD DISK, RECEIVE SELF_ID PACKET
OF ID = 1 FROM HARD DISK, AND TRANSFER IT TO DIGITAL CAMERA
AND DVD DRIVE

(P54) RECEIVE IDENT_DONE AND SPEED SIGNAL FROM HARD DISK AND
OUTPUT SPEED SIGNAL OF MAXIMUM TRANSFER SPEED OF
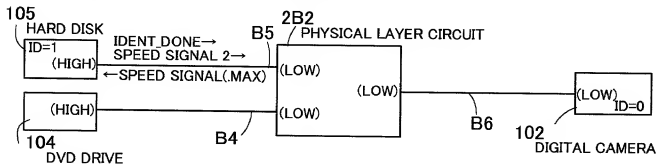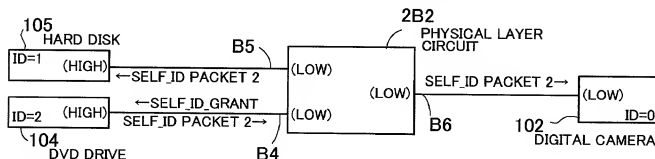PHYSICAL LAYER CIRCUIT TO HARD DISK

FIG. 25

SELF-IDENTIFYING OPERATION (2) IN SECOND CONSTRUCTION EXAMPLE
OF SECOND EMBODIMENT (IN THE CASE WHERE DEVICE CONNECTED ON THE
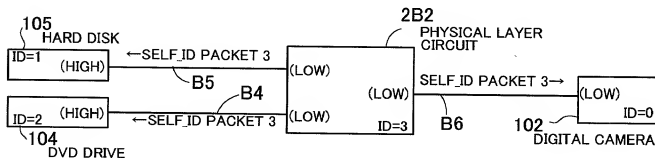OTHER SIDE DOES NOT HAVE DEVICE HAVING HIGH ARBITRATION)

(P55) OUTPUT SELF_ID GRANT TO DVD, RECEIVE SELF_ID PACKET FROM
DVD DRIVE, AND TRANSFER IT TO DIGITAL CAMERA AND HARD DISK

(P56) RECEIVE IDENT_DONE AND SPEED SIGNAL FROM DVD DRIVE AND
OUTPUT SPEED SIGNAL OF MAXIMUM TRANSFER SPEED OF
PHYSICAL LAYER CIRCUIT TO DVD DRIVE
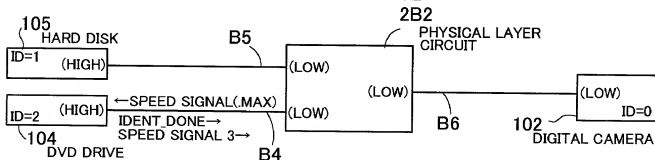
(P57) OUTPUT SELF_ID PACKET OF ID = 3

(P58) OUTPUT SELF_ID PACKET OF ID = n AND FINISH
SELF-IDENTIFYING OPERATION